UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/574,866	05/19/2000	James M. Rehg	200308344-1	1569

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EXAMINER
VO, LILIAN

ART UNIT	PAPER NUMBER
2127	7

DATE MAILED: 03/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)	
Office Action Summary	09/574,866	REHG ET AL.	
	Examiner	Art Unit	
	Lilian Vo	2127	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _19 May 2000_.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1 - 53_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1 - 53_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _2, 3, 6_.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1.   Claims 1 – 53 are pending.

Specification

2.   The attempts to incorporate subject matter into this application by reference to

Attorney Docket Numbers (specification page 16, lines 23 – 26 and page 20, lines 18 –

20) are improper. Applicants need to provide application serial numbers for the co-

pending applications.

Claim Rejections - 35 USC § 112

3.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

4.   Claims 1 – 53 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter

which applicant regards as the invention.

5.   **Claim 1** recites the limitations "the steps", "the lowest", "the static schedule" and

"the scheduling state" in page 26, lines 1 and 6 –7. There is insufficient antecedent basis

for this limitation in the claim.

6.   **Claims 4, 15 and 16** recite the limitation "the steps" in page 26, line 1 and page

28, line 2. There is insufficient antecedent basis for this limitation in the claim.

7.   **Claims 5 and 6** recite the limitations "the selected" and "the lowest" in page 26,

lines 1 – 2 and line 1, respectively. There is insufficient antecedent basis for this

limitation in the claim.

8.   **Claims 9 and 13** recite the limitation "the step" in page 27, line 1. There is

insufficient antecedent basis for this limitation in the claim.

9.   **Claims 11 and 12** recite the limitation "discounts older execution results at the

expense of <u>more recent</u> execution results", page 27, lines 2 – 3. This is considered

unclear and vague. For the purpose of the examination, the examiner will assume that it

is referring to the most recent or the previous execution results.

        Appropriate clarification is required.

10.   **Claims 11, 12, 28, 29, 45 and 46,** recite the limitation "the expense" in pages 27,

30 and 32, line 3, respectively. There is insufficient antecedent basis for this limitation in

the claim.

11.   **Claim 15** recites the limitation "the stored" in page 28, line 5. There is

insufficient antecedent basis for this limitation in the claim.

12.   **Claim 16** recites the limitation "the processor" in page 28, line 4. There is

insufficient antecedent basis for this limitation in the claim.

13.   **Claim 17** recites the limitations "the optimized", "the schedule analyzer" and "the

next" in page 28, lines 1 - 2. There is insufficient antecedent basis for this limitation in

the claim.

14.   **Claims 18, 35, 52 and 53** recite the limitations "the lowest", "the static schedule"

and "the scheduling state" in page 28, lines 7, 8, page 31, lines 6, 7, page 33, lines 9, 10,

and page 34, lines 8 – 9, respectively. There is insufficient antecedent basis for this

limitation in the claim.

15.   **Claims 22 and 39** recite the limitation "the lowest" in pages 29 and 31, line 2.

There is insufficient antecedent basis for this limitation in the claim.

16.   **Claims 25 and 42** recite the limitation "the computed in pages 29 and 32, line 2.

There is insufficient antecedent basis for this limitation in the claim.

17.   **Claims 32 and 33** recite the limitations "the stored", and "the processor" in page

30, lines 3 and 2 – 3, respectively. There is insufficient antecedent basis for this

limitation in the claim.

18.   **Claims 34 and 51** recite the limitations "the optimized", and "the next" in pages

30 and 33, lines 1 - 2. There is insufficient antecedent basis for this limitation in the

claim.

19.   **Claim 48** recites the limitation "the predicted" in page 32, line 2. There is

insufficient antecedent basis for this limitation in the claim.

20.   **Claims 49 and 50** recite the limitations "the on-line", "the stored", and "the

processor" pages 32 - 33, lines 1, 4 and 1 – 3, respectively. There is insufficient

antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

21.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

22.   Claims 1, 18, 35 and 53 are rejected under 35 U.S.C. 102(b) as being anticipated

by Horn (US 4,607,325).

23.   Regarding **claims 1, 18, 35 and 53**, Horn teaches a scheduling method comprising steps of:

based on scheduling states, defining a set of static schedules for an application (abstract, col. 4, line 62 – col. 5, line 55, col. 10, lines 21 - 37);

during run time, learning a cost of a set of static schedules based on performance of the application (abstract, col. 4, line 62 – col. 5, line 55, col. 10, lines 21 - 37); and

designating the static schedule with the lowest cost as an optimal schedule for the scheduling state (abstract, col. 4, line 62 – col. 5, line 55, col. 10, lines 21 - 37).

24.   Claims 1, 18, 35 and 53 are rejected under 35 U.S.C. 102(e) as being anticipated by Dave (US 6,178,542).

25.   Regarding **claims 1, 18, 35 and 53**, Dave teaches a scheduling method comprising steps of:

based on scheduling states, defining a set of static schedules for an application (abstract, col. 2, lines 47 – 59, col. 4, lines 53 – 66, col. 5, line 54 – col. 6, line 18, 45 – 67, col. 13, lines 40 - 58);

during run time, learning a cost of a set of static schedules based on performance of the application (abstract, col. 2, lines 47 – 59, col. 4, lines 53 – 66, col. 5, line 54 – col. 6, line 18, 45 – 67, col. 13, lines 40 – 58); and

designating the static schedule with the lowest cost as an optimal schedule for the

scheduling state (abstract, col. 2, lines 47 – 59, col. 4, lines 53 – 66, col. 5, line 54 – col.

6, line 18, 45 – 67, col. 13, lines 40 – 58).

26.   Claims 1 – 12, 15, 18 – 29, 32, 35 - 46, 49, 52 and 53 are rejected under 35

U.S.C. 102(e) as being anticipated by Jevtic et al. (US 6,519,498, hereinafter Jevtic).

27.   Regarding **claims 1, 18, 35 and 53**, Jevtic teaches a scheduling method

comprising steps of:

based on scheduling states, defining a set of static schedules for an application

(abstract, fig. 3, col. 4, line 40 – col. 5, line 9, lines 32 – 53, col. 6, lines 31 – 61);

during run time, learning a cost of a set of static schedules based on performance

of the application (abstract, fig. 3, col. 4, line 40 – col. 5, line 9, lines 32 – 53, col. 6, lines

31 – 61, col. 11, lines 3 – 13, col. 2, line 63 – col. 3, line 13); and

designating the static schedule with the lowest cost as an optimal schedule for the

scheduling state (abstract, fig. 3, col. 4, line 40 – col. 5, line 9, lines 32 – 53, col. 6, lines

31 – 61, col. 11, lines 3 - 13, col. 2, line 63 – col. 3, line 13).

28.   Regarding **claim 2**, Jevtic teaches a scheduling method as claimed in claim 1

wherein the cost of a set of static schedules is learned each time there is a change in

scheduling state (fig. 3 and col. 21, lines 46 – 50).

29.   Regarding **claim 3**, Jevtic teaches a scheduling method as claimed in claim 1

wherein the cost of a set of static schedules is learned continuously during run time (fig. 3

and col. 21, lines 16 - 17).

30.   Regarding **claim 4**, Jevtic teaches a scheduling method as claimed in claim 1

further comprising the steps of:

storing a set of all possible schedules associated with each schedule state (fig. 3);

and

upon a change of state, selecting the optimal schedule associated with the

schedule state (fig. 3).

31.   Regarding **claim 7**, Jevtic teaches a scheduling method as claimed in claim 6

wherein the schedule is randomly selected dependent on utility of exploration associated

with the schedule (abstract).

32.   Regarding **claim 8**, Jevtic teaches a scheduling method as claimed in claim 1

wherein the cost of a schedule is computed and stored after the schedule is executed (fig.

3).

33.   Regarding **claim 9**, Jevtic teaches a scheduling method as claimed in claim 1

further comprising the step of:

maintaining a task execution cost for each task in the application for each

schedule state (fig. 3).

34. Regarding **claims 11 and 12**, Jevtic teaches a method as claimed in claim 10

wherein the cost of a task/schedule is updated using a sliding window, which discounts

older execution results at the expense of more recent execution results (fig. 3, col. 6, lines

10 – 61).

35. Regarding **claim 15**, Jevtic teaches a scheduling method as claimed in claim 1

wherein the step of learning further comprises a step of:

storing application input data received during an active period in the application

(col. 6, lines 16 – 39); and

exploring optimal schedules while replaying the stored input data during an idle

period in the application (col. 6, lines 16 – 53, col. 12, lines 48 - 60).

36. Regarding **claim 52**, Jevtic teaches a computer system comprising:

a CPU connected to a memory system by a system bus (fig 2);

an I/O system, connected to the system bus by a bus interface (fig. 2); and

a scheduling system routine located in the memory system (fig. 2) which:

based on scheduling states, defining a set of static schedules for an

application (abstract, fig. 3, col. 4, line 40 – col. 5, line 9, lines 32 – 53, col. 6,

lines 31 – 61);

during run time, learning a cost of a set of static schedules based on

performance of the application (abstract, fig. 3, col. 4, line 40 – col. 5, line 9, lines

32 – 53, col. 6, lines 31 – 61, col. 11, lines 3 – 13, col. 2, line 63 – col. 3, line 13);

and

designating the static schedule with the lowest cost as an optimal schedule

for the scheduling state (abstract, fig. 3, col. 4, line 40 – col. 5, line 9, lines 32 –

53, col. 6, lines 31 – 61, col. 11, lines 3 - 13, col. 2, line 63 – col. 3, line 13).

37.   **Claims 5, 6, 10, 19 – 29, 32, 36 – 46 and 49** are rejected on the same ground as

stated above.

Claim Rejections - 35 USC § 103

38.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

39.   Claims 13, 14, 16, 17, 30, 31, 33, 34, 47, 48, 50 and 51 are rejected under 35

U.S.C. 103(a) as being unpatentable over Jevtic et al. (US 6,519,498, hereinafter Jevtic)

as applied to claims 1, 15, 18, 32, 35 and 49 above, in view of Dave (US 6,178,542).

40.   Regarding **claim 13**, Jevtic did not teach the additional limitation as claimed.

Nevertheless, Dave teaches the step of:

predicting the cost of a schedule dependent on stored task execution costs

(abstract, col. 12, lines 26 – 56, col. 15, lines 31 – 38, and figs 6 - 10).

It would have been obvious for one of an ordinary skill in the art, at the time the

invention was made to incorporate Dave's teaching to Jevtic's invention so that schedule

estimation cost could be obtained to enhance system performance.

41.   Regarding **claim 14**, Jevtic did not teach the additional limitation as claimed.

Nevertheless, Dave teaches a schedule is selected for further exploration dependent on

the predicted schedule cost (abstract, col. 12, lines 26 – 56, col. 15, line 31 – col. 16, line

21, and figs 6 - 10).

It would have been obvious for one of an ordinary skill in the art, at the time the

invention was made to incorporate Dave's teaching to Jevtic's invention so that

performance estimation cost could be obtained for more efficient scheduling.

42.   Regarding **claim 16**, Jevtic did not teach the additional limitation as claimed.

Nevertheless, Dave teaches the step of concurrently executing a copy of an application

with identical input data on a processor other than the processor on which the application

is executing (col. 1, lines 34 – 41, col. 2, lines 29 – 33 and fig. 9: a system employs

heterogeneous distributed architectures with several processors that run a large number of

tasks concurrently).

It would have been obvious for one of an ordinary skill in the art, at the time the

invention was made to incorporate Dave's teaching to Jevtic's invention to provide the

system with a capability of parallel processing on multiple processors.

43.   Regarding **claim 17**, Jevtic teaches the additional limitation as claimed, wherein a

change in the optimized schedules is immediately reflected to the schedule analyzer for

use in the next schedule change of the application (abstract, fig. 3, col. 4, line 40 – col. 5,

line 9, lines 32 – 53, col. 6, lines 31 – 61, col. 11, lines 3 - 13, col. 2, line 63 – col. 3, line

13 and fig. 3).

44.   **Claims 30, 31, 33, 34, 47, 48, 50 and 51** are rejected on the same ground as

stated above.

Conclusion

45.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure. Shannon, US 6,088,678: disclosed a process simulation technique

using benefit-trade matrices to estimate schedule, cost, and risk. Gonyea et al., US Pat.

App. Publication 2001/0032109 A1: disclosed a system and method for predicting a

maintenance schedule and costs for performing future service events of a product.

Babaian et al, US Pat. App. Publication 2001/0042189 A1: disclosed a single-chip

multiprocessor system and operation method of the system based on a static macro-scheduling of parallel streams for multiprocessor parallel execution. Tarsy et al., US 5,367,687: disclosed a method for optimizing cost-based heuristic instruction scheduling for a pipelined processor. Kahn, US 5,619,502: disclosed a system including a static scheduler and a dynamic scheduler.

46.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lilian Vo whose telephone number is 703-305-7864. The examiner can normally be reached on Monday - Thursday, 7:30am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on 703-305-9678. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

                                                        Lilian Vo
                                                        Examiner
                                                        Art Unit 2127

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March 19, 2004   MENG-AI. AN
                                        SUPERVISORY PATENT EXAMINER
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